

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
International application No. PCT/DE 02/04729

I. Basis of the report

1. This report has been drawn on the basis of (*Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17)*):

The description, pages:

1-11 as originally filed

The claims, Nos.:

1-11, 13-17 as originally filed
12 received October 23, 2003 with
the letter of October 21, 2003

The drawings, sheets/fig.:

1/2-2/2 as originally filed

III. No opinion is being issued with regard to novelty, inventive step, and industrial applicability

1. The question whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable has not been examined with respect to:

☒ Claim No. 12

☒ The above-mentioned Claim No.12 is so inadequately supported by the description or the drawing that no meaningful opinion could be formed.

see appended sheet

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT,

Novelty (N)	Yes: Claims 1-11
	No: Claims
Inventive Step (IS)	Yes: Claims 1-11
	No: Claims
Industrial Applicability (IA)	Yes: Claims 1-11
	No: Claims

**2. CITATIONS AND EXPLANATIONS
see appended sheet**

Re: Section V:

It is known according to US A 5,370,099 (claims, figures, cols. 2, 3, 4) to detect the phase of an internal combustion engine cylinder based upon voltage signals which are measured during the entire spark duration of a spark in the combustion chamber of this cylinder, the voltage signals at the time of a spark being triggered at the top dead center (TDC) of the compression stroke being compared with the voltage signals at the time of a spark being triggered at the TDC of the exhaust stroke of the same cylinder.

Based on the above-mentioned related art, those skilled in the art are encouraged by US A 5,174,267 (abstract, claims, figures, col. 8) to also use the spark duration of a spark close to the respective TDC, for the purpose of differentiating a compression stroke and an exhaust stroke for detecting the phase.

According to both documents, combustion takes place upon ignition at the TDC of the compression stroke since fuel has been supplied.

This does not suggest, however, to use the spark durations of a spark in one and the same cylinder at two successive TDCs with suppressed fuel supply for the determination of the cylinder phase to avoid catalytic converter damage by the discharge of unburnt fuel injected directly into the combustion chamber.

Therefore, the object as recited in Claim 1 (-11) regarding inventive step seems ... [the rest of the sentence is missing]

Re: Section III:

It is incomprehensible what a measuring device "for measuring a ... secondary voltage... during the crankshaft rotation without a supply of fuel..." should represent, because it is not evident how such a measuring device should differ from a measuring device for measuring a secondary voltage during the crankshaft rotation with fuel being supplied. Both measuring devices only have to measure the secondary voltage.

The device as recited in Claim 12 would be clearer if Claim

12 defined the provision of:

Means to suppress the fuel supply during the engine strokes prior and during the measurement of the primary voltage or secondary voltage, or the primary current or the secondary current.

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New Claim No. 12

12. A device for detecting a phase of a four-stroke gasoline engine comprising a primary circuit, a secondary circuit, an ignition coil, a spark plug, and an ignition transistor, the device having:
- a measuring device (12, 13, R1, R2; RM) for measuring a primary voltage or a secondary voltage, or a primary current or a secondary current during the crankshaft rotation at the times of successive top dead centers of a piston without the supply of fuel in a measuring period which extends at least over a spark duration (t-BR-I-TDC, t-BR-CC-TDC) after the ignition, and outputting of a measuring signal,
- an analyzing device (16; 18) for picking up the measuring signal of the measuring device and outputting a signal which indicates which of the successive top dead centers is an ignition top dead center (I-TDC) between the compression stroke and the power stroke and which is a charge cycle top dead center (CC-TDC) between the exhaust stroke and the intake stroke.

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